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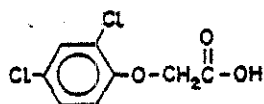
2,4-D FACT SHEET

July 24, 1981

I. 2,4-D DATA CALL-IN -- Progress Report

A. Background

2,4-Dichlorophenoxyacetic acid (2,4-D) is a systemic herbicide widely used to control broadleaf weeds. The term 2,4-D includes the parent acid as well as the 35 derivatives (esters and salts). The structure of 2,4-D acid is given below:



There are approximately 1500 products containing 2,4-D registered with the Environmental Protection Agency. Over 60 million pounds of 2,4-D active ingredient were applied domestically during 1980 with the majority used for the control of broadleaf weeds in small grains, field corn and on range and pastureland.

Interest concerning the potential adverse health effects of 2,4-D intensified following EPA's emergency suspension of 2,4,5-T and Silvex in March 1979. This interest was due to the chemical similarities of 2,4-D and 2,4,5-T. The public was concerned that the same toxic effects attributed to 2,4,5-T would also be applicable to 2,4-D. There was also concern that 2,4-D would be contaminated with 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) as was 2,4,5-T. This dioxin has been linked with potential fetotoxic and carcinogenic effects. The 2,3,7,8 TCDD has never been found in any sample of 2,4-D. A report of EPA's analysis for dioxins in 2,4-D is presented in part II of this fact sheet. There was also concern because the n-Butyl ester of 2,4-D was used in a 50:50 mixture with n-Butyl 2,4,5-T to produce Agent Orange, the military defoliant widely used during the Vietnam War. Agent Orange has never been registered by EPA for civilian use in the U.S., but its use by the U.S. military in Vietnam has resulted in claims of adverse health effects to American military personnel which are currently under review by the Veterans Administration.

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The Agency initiated a review of information available on 2,4-D in an attempt to answer questions raised concerning potential health effects associated with the use of 2,4-D. This review was conducted to determine if 2,4-D should be reviewed under the Rebuttable Presumption Against Registration (RPAR) process or if another regulatory action was appropriate.

B. Agency Review

After a review of the existing toxicology data base supporting 2,4-D registrations, EPA concluded that the scientifically valid toxicology studies on 2,4-D did not indicate that the continued use of 2,4-D posed a significant health hazard when used in accordance with label directions and precautions. The Agency did conclude, however, that more information on 2,4-D toxicological properties was necessary to better assess the potential health hazards associated with the use of 2,4-D.

C. Agency Actions

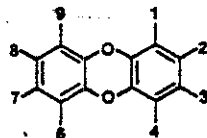
The Environmental Protection Agency has the authority under section 3(c)(2)(B) of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) to request any additional data from pesticide registrants considered necessary to maintain the registration of existing products. On August 29, 1980, after consulting with the Scientific Advisory Panel, the Agency issued an ORDER and NOTICE which required 2,4-D registrants to supply data in the following areas of 2,4-D toxicology: Oncogenicity, Reproduction, Teratogenicity, Neurotoxicity, Metabolism and Acute Toxicity.

Major registrants of technical 2,4-D products subject to this data call-in have formed the "Industry Task Force on 2,4-D Research Data" to jointly produce the required data. Testing has begun on the acute toxicity studies and results will be submitted to the Agency shortly. Results from the chronic feeding/oncogenicity studies will be submitted early in 1984. The Agency will also develop a long-term reregistration work plan for all 2,4-D products which should be completed concurrently with the final data submissions from the data call-in. Results from all studies will be reviewed as they are submitted to determine whether a change in regulatory position is warranted prior to the completion of the data call-in effort.

II. ANALYSIS FOR DIOXINS IN 2,4-D

A. Background

A dioxin is any member of a family of compounds known chemically as dibenzo-p-dioxins and consisting of two benzene rings interconnected by a pair of oxygen atoms. The general structure for dioxins is given below:



Each of the numbered positions can be occupied by a chlorine or other halogen atom, an organic radical, or a hydrogen atom. There are 75 potential isomers of polychlorinated dibenzo-p-dioxin and 22 different isomers of the tetrachlorodibenzo-p-dioxin (TCDD). The term dioxin is often used incorrectly to refer to only one of the 22 isomers of TCDD, the 2,3,7,8 TCDD. This isomer is the highly toxic contaminant of the herbicide 2,4,5-T and has been linked to potential fetotoxic and carcinogenic effects. The 2,3,7,8 TCDD isomer has never been detected in any U.S. samples of 2,4-D tested. For a detailed discussion of dioxins refer to Esposito et al. (1980) which is available through the National Technical Information Service, Springfield, VA 22161.

Canadian 2,4-D technical and formulated products were first reported to be dioxin-contaminated by a group from Agriculture Canada at the workshop on the "Impact of Chlorinated Dioxins and Related Compounds on the Environment" (Cochrane et al., 1980). Sixteen samples of 2,4-D ester and amine formulations as well as ten 2,4-D technical acid samples representing Canadian supplies available in 1980 were analyzed for chlorinated dibenzo-p-dioxins at a detection level of 1 part per billion (ppb). No dioxins were detected in the technical 2,4-D acid samples analyzed. All 2,4-D isooctyl ester samples examined contained dibenzo-p-dioxin contaminants, while 2 of 3 butyl esters and 4 of 7 2,4-D amines showed the presence of chlorodioxin. Levels of dichlorodibenzo-p-dioxin ranged from 5 to 4200 ppb, trichlorodibenzo-p-dioxin ranged from 38 to 2079 ppb and 1,3,6,8 tetrachlorodibenzo-p-dioxin ranged from 20 to 1752 ppb. Levels of all dioxins detected were highest in the isooctyl ester formulations and lowest in the amine salts.

B. Agency Actions

2,4-D Sampling Program

A sampling program of U.S.-produced technical grade 2,4-D products was initiated following Agriculture Canada's announcement of dioxin contaminated 2,4-D products in Canada. Thirty-three samples representing 25 2,4-D technical products produced in the U.S. were collected by EPA Enforcement personnel and delivered to the EPA Chemical and Biological Investigations Laboratory at Beltsville, Maryland for dioxin analysis. Formulations of 2,4-D represented were: acid, sodium salt, various amine salts and several esters. Samples were analyzed using the method of Cochrane et al. (1980). Refinements to the method using appropriate recovery studies validated the technique to a 1 part per billion (ppb) level of sensitivity. All samples were extracted and put through a cleanup and isolation procedure. Final extracts were subjected to low resolution gas chromatograph/mass spectrometer (LR/GC/MS) analysis using software control which allowed detection for ions at mass values of 252, 288 and 322. These ions corresponded to 2,7-dichloro-; 1,2,4-trichloro-; and 1,3,6,8/1,3,7,9 tetrachlorodibenzo-p-dioxins, respectively. The samples were also examined specifically for 2,3,7,8 TCDD and none was found.

Results

Three samples were positive for 2,7 dichlorodibenzo-p-dioxin (Table 1). Levels ranged from 25 to 78 ppb. Two of these three samples also contained the trichlorodibenzo-p-dioxin isomer at levels of 11 to 13 ppb. No tetrachlorodibenzo-p-dioxin was detected in any sample. Sample extracts found to be positive for dioxin were transmitted to the Health Effects Research Laboratory (HERL) at Research Triangle Park, North Carolina for high resolution/GC/MS confirmation. HERL confirmed the presence of the dichlorodioxin and also detected trace amounts (<1 ppb) of 1,3,6,8/1,3,7,9 tetrachlorodibenzo-p-dioxin in two of the three positive samples when analyses were performed at higher sensitivity. The 2,3,7,8 TCDD was never detected in any sample even when analyzed with HR/GC/MS.

Conclusions

Of 33 samples of 2,4-D technical grade acid, ester and salt formulations examined, 30 were free of dioxin contamination. Only three were contaminated with any form of dioxin. The dioxins detected were: 2,7 dichlorodibenzo-p-dioxin, 1,2,4 trichlorodibenzo-p-dioxin and 1,3,6,8/1,3,7,9 tetrachlorodibenzo-p-dioxin. The 2,3,7,8 tetrachlorodibenzo-p-dioxin isomer was never detected in any sample.

Information about the dioxins found in U.S.-produced 2,4-D is limited, but existing references indicate they are significantly less toxic than the 2,3,7,8 TCDD isomer present in 2,4,5-T (see Leng, 1979; Esposito et al., 1980). Based on preliminary analyses conducted on available data, the Agency believes that the concentrations of the dioxins found in U.S.-produced 2,4-D products do not appear to pose a significant health hazard. The Agency has determined that a change in regulatory position concerning 2,4-D uses or production in the U.S. is not warranted at this time.

C. Continuing Agency Review Efforts

The Agency will continue to monitor dioxin levels in U.S.-manufactured 2,4-D products. The Agency will also complete a detailed review of data available on the dioxins found in 2,4-D and determine whether further studies are needed.

REFERENCES

- Cochrane, W.P., J. Singh, W. Miles, B. Wakeford, J. Scott. 1980. Analysis of technical and formulated products of 2,4-Dichlorophenoxyacetic acid for the presence of chlorinated dibenzo-p-dioxins. Presented at the workshop on the "Impact of Chlorinated Dioxins and Related Compounds on the Environment", Rome, October 1980.
- Esposito, M.P., T.O. Tiernan, F.E. Dryden. 1980. Dioxins EPA report 600/2-80-197. EPA Office of Research and Development, Cincinnati, OH.
- Leng, M.L. 1979. Comparative toxicity of various chlorinated dioxins as related to chemical structure. Proc. of Collaborative International Pesticide Advisory Council (CIPAC) Symp. Baltimore, MD, June 1979.

Table 1. Dioxin Content of Some Selected Technical Grade 2,4-D Samples

No. Subs	Sample Type	Sample Number	ppb 2,7 DCD	ppb 1368/1379 TCDD	ppb 1,2,4 TriCD
1	Butyl Ether Ester	C70461	ND ^a	ND	ND
1	Butoxy Propyl Ester	C70459	62	ND	11
1	Iso Octyl Ester	C70460	ND	ND	ND
1	Butyl Ester	C70456	ND	ND ^b	ND
1	Acid	C70462	78	ND ^b	13
1	Alkanoyl Amine	C70457	ND	ND	ND
1	Dimethyl Amine	C70458	ND	ND	ND
1	Dimethyl Amine	180846	ND	ND	ND
2	Sodium Salt	124940	ND	ND	ND
1	Iso Octyl Ester	124390	ND	ND	ND
2	Iso Octyl Ester	124939	ND	ND	ND
1	Iso Octyl Ester	359-577	ND	ND	ND
1	Butyl Ester	359-584	ND	ND	ND
1	Iso Octyl Ester	359-411	ND	ND	ND
1	Iso Butyl Ester	011122	ND	ND	ND
1	Iso Octyl Ester	011121	ND	ND ^b	ND
1	Acid	011123	25	ND ^b	ND
3	Acid	122037	ND	ND	ND
3	Iso Octyl Ester	122036	ND	ND	ND
3	Dimethyl Amine	122035	ND	ND	ND
1	Iso Octyl Ester	011201	ND	ND	ND
1	Acid	359-579	ND	ND	ND
1	Acid	142614	ND	ND	ND
1	Butyl Ester	142615	ND	ND	ND
1	Iso Octyl Ester	142616	ND	ND	ND

a) Not detectable at less than 1.0 ppb (LR/GC/MS)

b) Trace amount detected using HR/GC/MS (<1 ppb)